60137-026

IN THE SPECIFICATION:

Please amend the numbered paragraphs in specification to:

[16] Figure 2D is a sectional view of a valve assembly according to the present invention in an open position; and

[16.5] Figure 3 is a graph illustrating the pressure increase and sequential opening of each valve of the valve assembly according to the present invention in a closed position.

[18] The mix head assembly 22 thoroughly mixes the fluid material from the feed assembly 14 in a mix section (illustrated schematically at M; Figure 1B) and injects the final mixture through an outlet (illustrated schematically at O) into a mold assembly 23 or the like. Preferably, a controller 24 communicates with the feed assembly 14, valve assemblies 20, and the mix head assembly 20 to assure the system 10 is operating within predefined parameters. Controls for injection-molding equipment are known in the art and further description of the algorithms will not be further detailed herein. System 10 is preferably utilized for injection molding of very large parts, and in particular bathtubs and shower surrounds.

[19] Referring to Figure 2A, a cross sectional view of one valve assembly 20 according to the present invention is illustrated. The valve assembly 20 generally includes an input port 26, an output port 28 and a passage 30 there between all located within a single housing 31. The input port 26 communicates with one of the output conduits 18 from the feed assembly 14 (Figure 1A). It should be understood that although only a single valve assembly will be described in the

disclosed embodiment, a separate valve assembly is preferably separately provided for each fluid material 12A-12C (Figure 1A).

[24] Each of the valves 32A-32C includes a first or top seal 42 and a second or bottom seal 44. It should be realized that the terms "top" and "bottom" refer to the location of the seal relative to the spring 39 and should not be construed to relate to the overall positioning of the valve assembly 20. The seals 42,44 assure that each valve 32A-32C are properly sealed in the chambers 34A-34C while preventing rotation of the valves 32A-32C therein such that their openings 36A-36C are alignable with the passage 30. The seals 42, 44 also operate as stops to restrain longitudinal movement of the valves 32A-32C relative to the passage 30. Preferably, the seals 42, 44 are threadable into the valve 32 so that the positioning of the opening can be finely adjusted.

[28] The bottom seal 44 of valves 32B and 32C, maintain opening 36B, 36C at least partially in line with passage 30. In other words, a portion of opening 36B and 36C are aligned with passage 30 such that fluid can fluid can flow there through. Preferably, opening 36B and 36C are positioned such that the amount of flow through openings 36B and 36C is at least equivalent to flow through opening 36A when opening 36A is fully open. That is, flow through opening 36A when valve 32A is in its fully open position (Figure 2B) provides the limiting flow restriction as openings 36B and 36C provide equivalent flow to that through the fully open valve 32A. Fluid flow through passage 30 is thus limited by valve 32A.

[30] Upon initiation of the system 10, the feed assembly 14 drives the fluid material component (BPO in this example) to the valve assembly 20. As the feed assembly

14 forces material into the closed valve assembly 20 (Figure 2A) the fluid material pressure increase. The pressure is identified by the sensor 40 and relayed to the controller 24. The feed assembly 14 continues to force fluid material against closed valve 32A until the pressure is above a predetermine value. The predetermined value is determined in part by the viscosity of the fluid material component, its percentage relative to the other components, and the desired feed rate of the feed system. Here, the predetermined value V-1 for BPO is 50 psi. Once the pressure is above 50 psi the controller 24 releases the pressure from the actuator 38A such that valve 32A opens under the force of the spring 39 (Figure 2B). Valve 32A is opened by the spring 39 until top seal 42 contacts the chamber 34A and opening 36A is aligned with the passage 30. Fluid material may now flow through the valve assembly 20 at a rate suppressed by valve 32A.

[32] Once the pressure reaches a second value V-2 (75 psi) the controller 24 releases the pressure from actuator 38B and valve 32B opens under the force of its spring 39 (Figure 2C). Valve 32B is opened by the spring 39 until top seal 42 contacts the chamber 34B such that the opening 36B is aligned with the passage 30. The restriction of valve 32A is now replaced by the lesser restriction of valve 32B. As the feed assembly 14 continues to force material into the valve assembly 20, the fluid material flows through the fully open valves 32A and 32B and through the partially open valve 32C. Again, valve 32C is partially open to the extent that valve 32B is the limiting restriction in passage 30. In other words, valve 32C is partially opened to be approximately equivalent to the flow restriction provided by valve 32B in the fully open condition (Figure 2C). The continued pressure buildup is thus further relieved. Finally, as the feed assembly 14 reaches a third value V-3 (100 psi) valve 32C is opened (Figure 2d) and the fluid material flow into the mix head 22 is stabilized at a steady state. Notably, by opening each valve 32A-32C at